Importance of International Collaboration

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NASA Aeronautics Research Mission Directorate

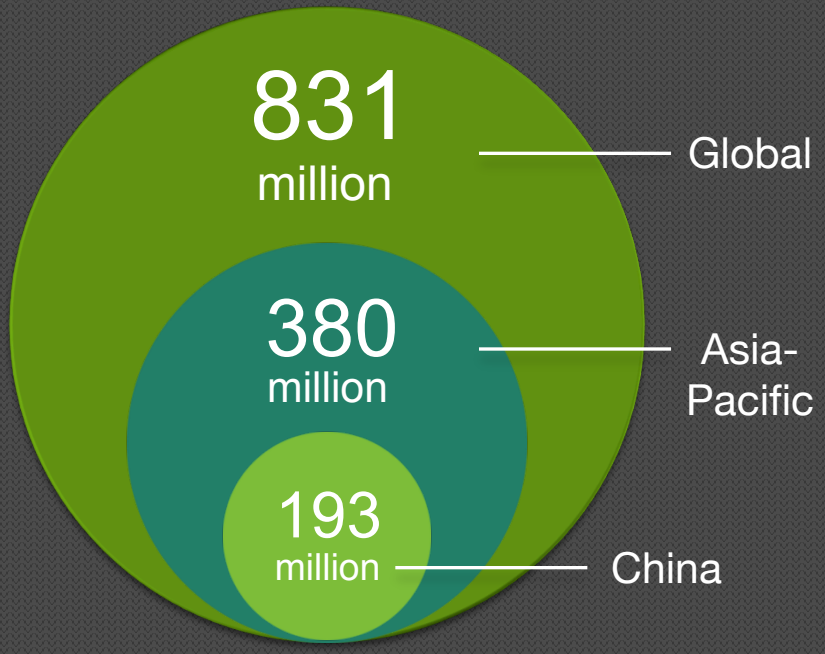
VKI PhD Symposium, 13 March 2015

Global Trends

Growing and Moving East

Growth in passengers and traffic dominated by Asia Pacific region and aircraft orders and deliveries reflect this shift

Traffic in Asia-Pacific is forecasted to triple by 2030

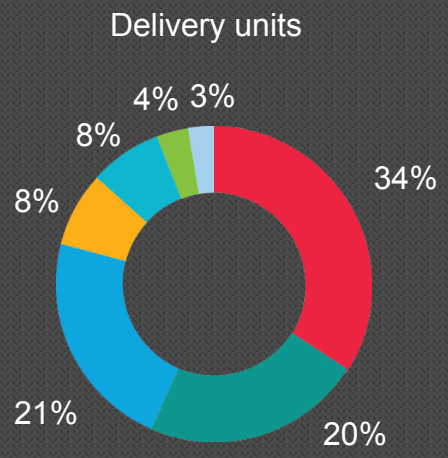


Estimated additional passenger volume in 2016 vs 2011

New airplanes Deliveries by region

Region	New airplanes
Asia Pacific	13,460
Europe	7,450
North America	7,550
Latin America	2,950
Middle East	2,950
CIS	1,330
Africa	1,080
Total	36,770

Current Market Outlook
2014-2033

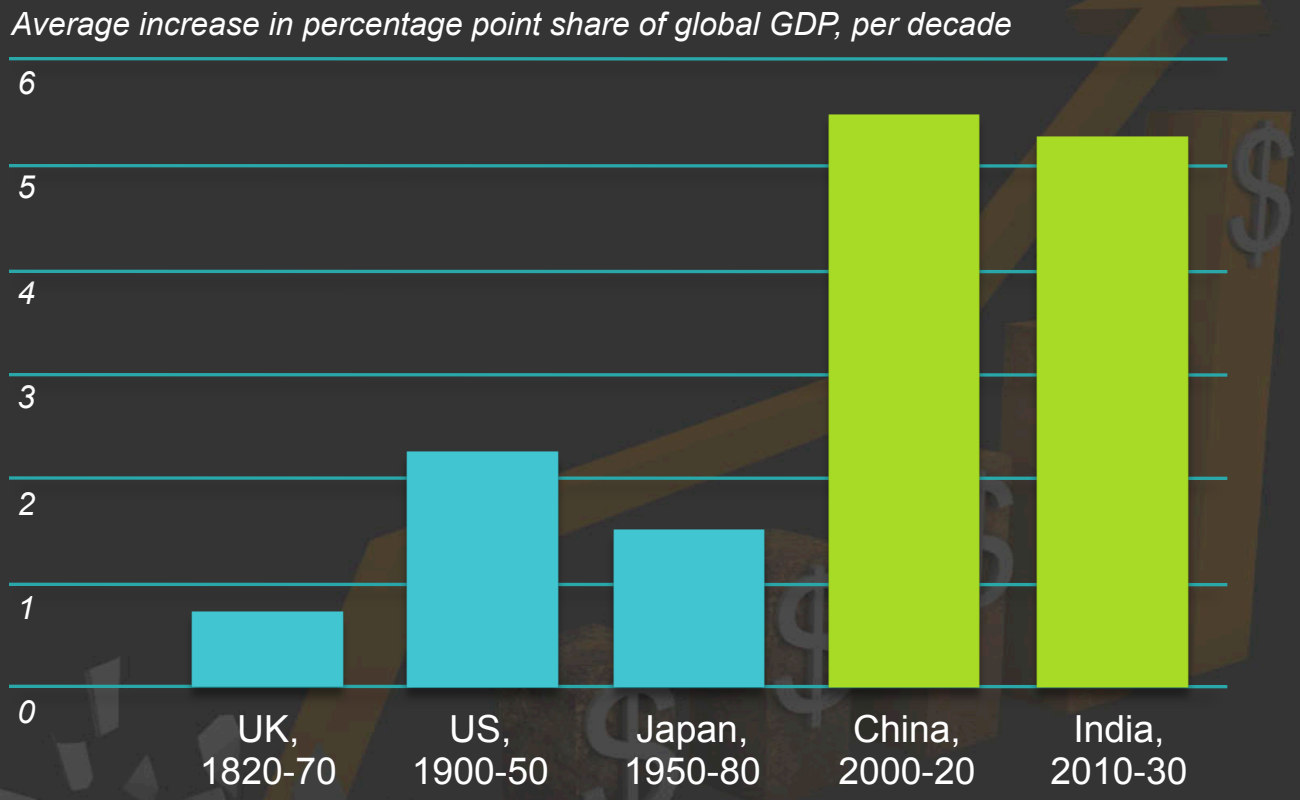


2014 to 2033
New airplanes
36,770

Source: Boeing

Global Trends

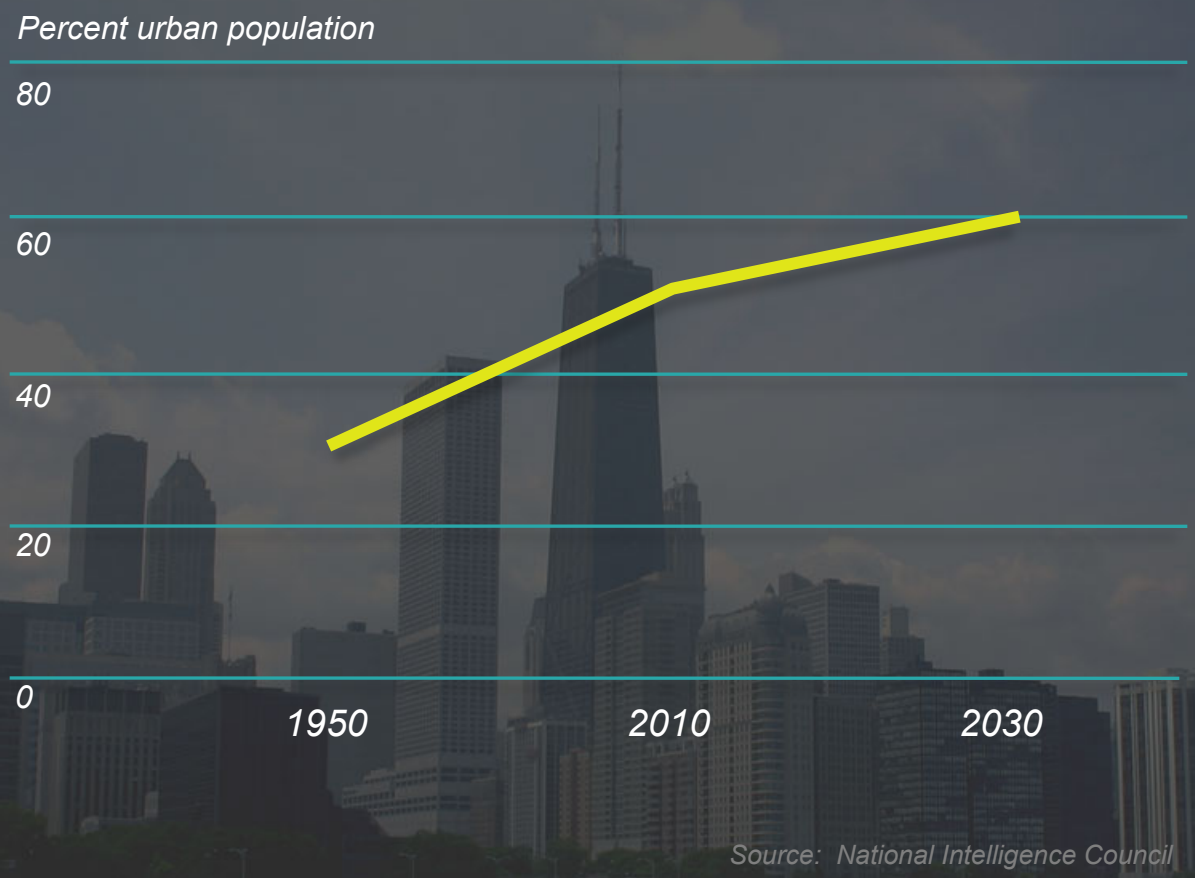
China & India Growing Economically at Historically Unprecedented Rates



Global Footprint Network Living Plant Report 2010, p89.

Global Trends

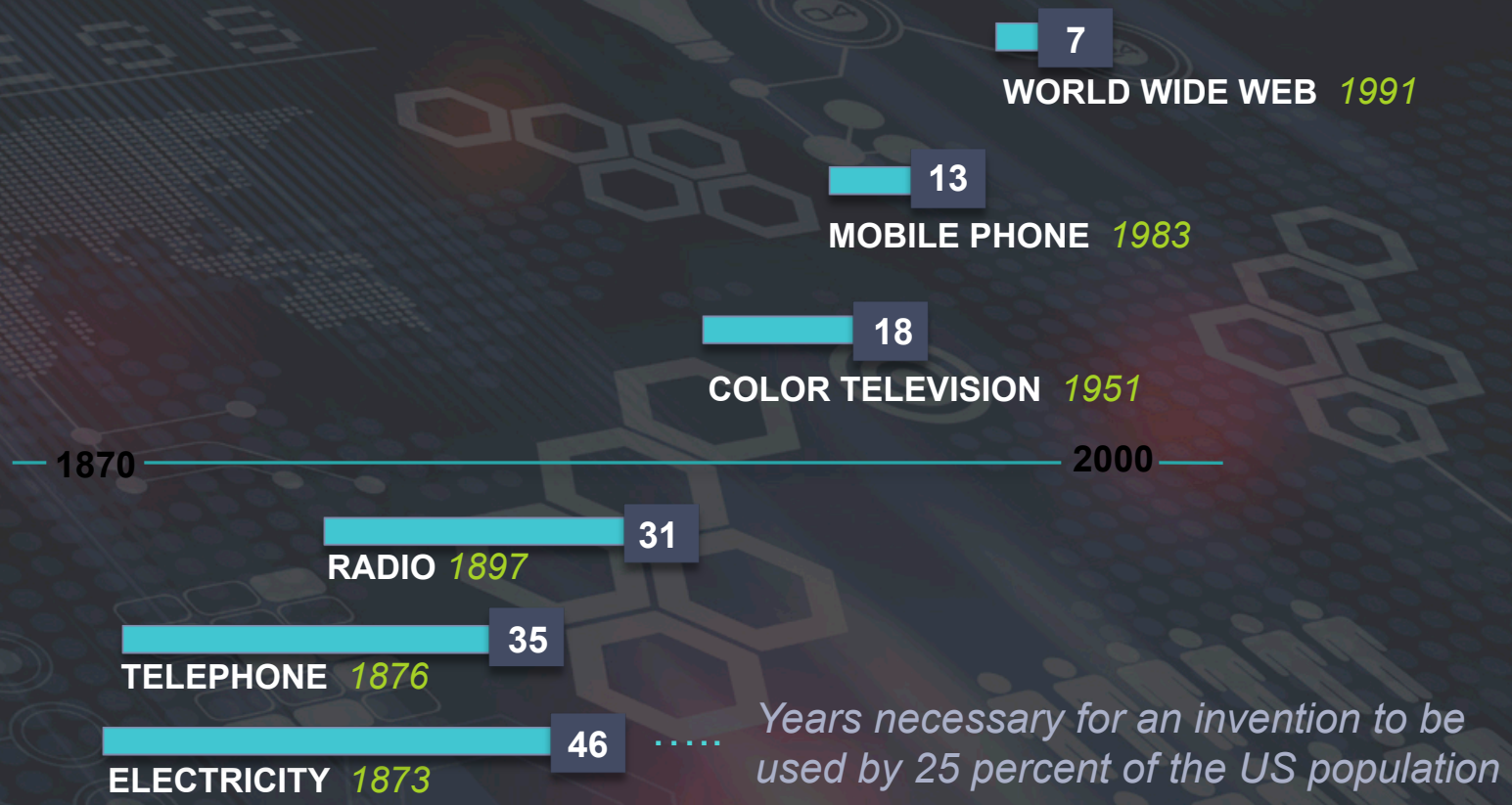
Rapid Urbanization



Source: National Intelligence Council

Global Trends

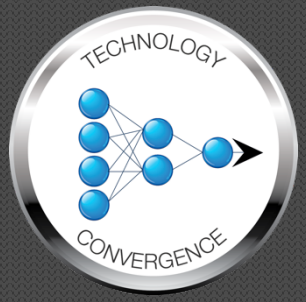
Technology Development and Adoption is Accelerating



Source: National Intelligence Council

NASA

NASA's 6 Strategic Research and Technology Thrusts



Safe, Efficient Growth in Global Operations

- Enable full NextGen and develop technologies to substantially reduce aircraft safety risks

Innovation in Commercial Supersonic Aircraft

- Achieve a low-boom standard

Ultra-Efficient Commercial Vehicles

- Pioneer technologies for big leaps in efficiency and environmental performance

Transition to Low-Carbon Propulsion

- Characterize drop-in alternative fuels and pioneer low-carbon propulsion technology

Real-Time System-Wide Safety Assurance

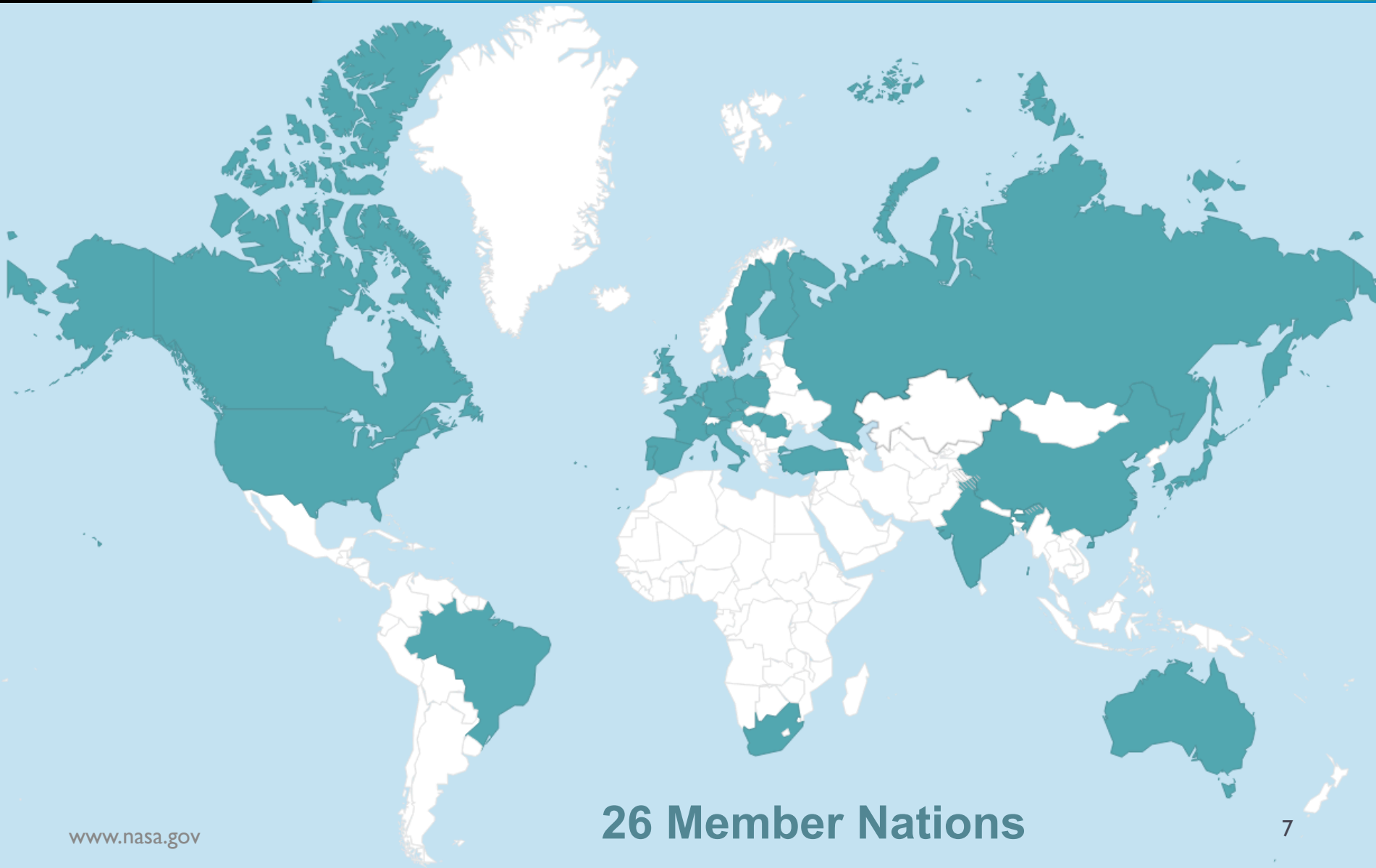
- Develop an integrated prototype of a real-time safety monitoring and assurance system

Assured Autonomy for Aviation Transformation

- Develop high impact aviation autonomy applications

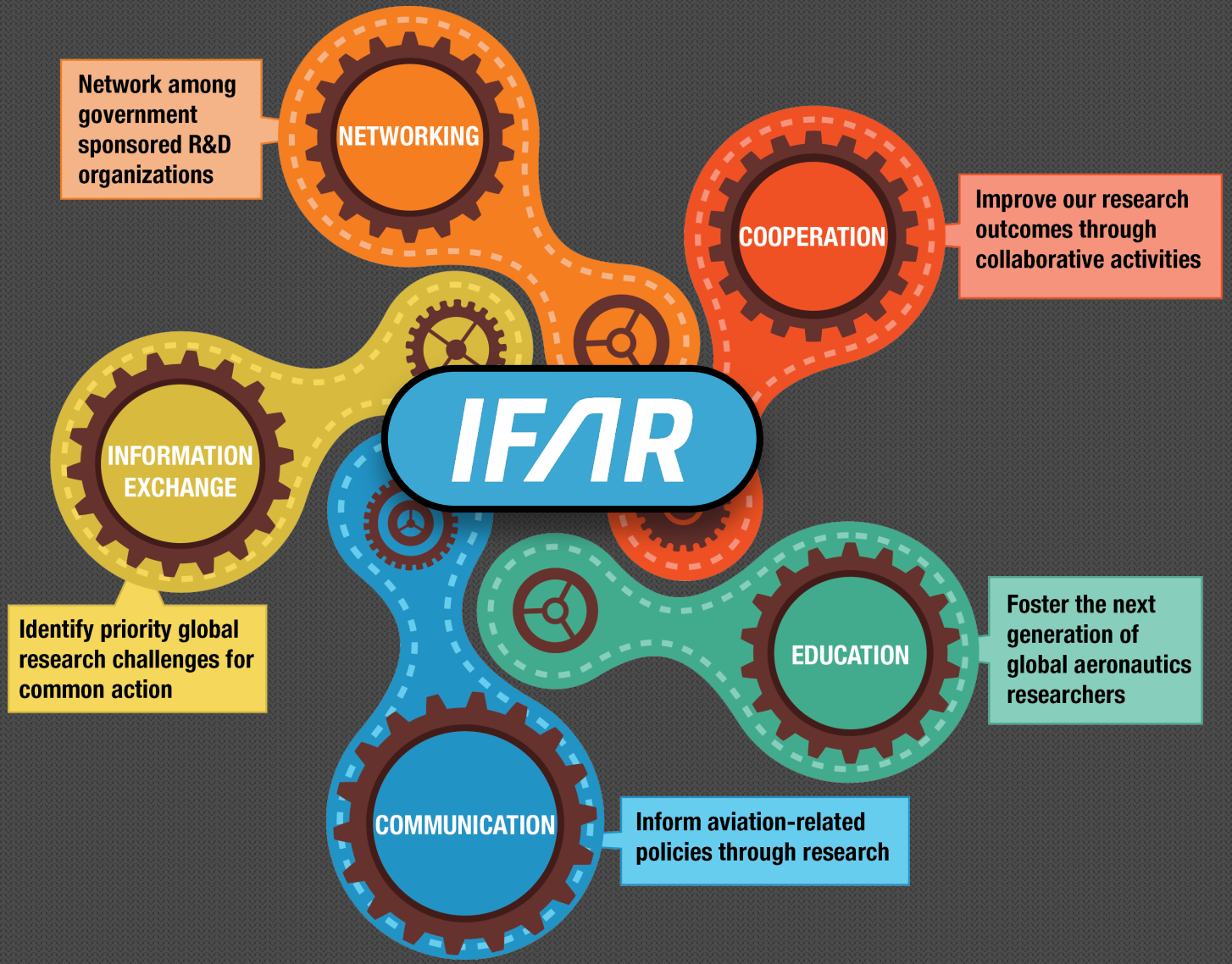
IFAR

International Forum for Aviation Research



26 Member Nations

Objectives of IFAR



IFAR

Young Researcher Network Opportunities

for researchers in their 20's and 30's

www.ifarlink.aero

IFARlink

- Network with colleagues
- Collaborate on research
- Find or post job, funding, and award opportunities

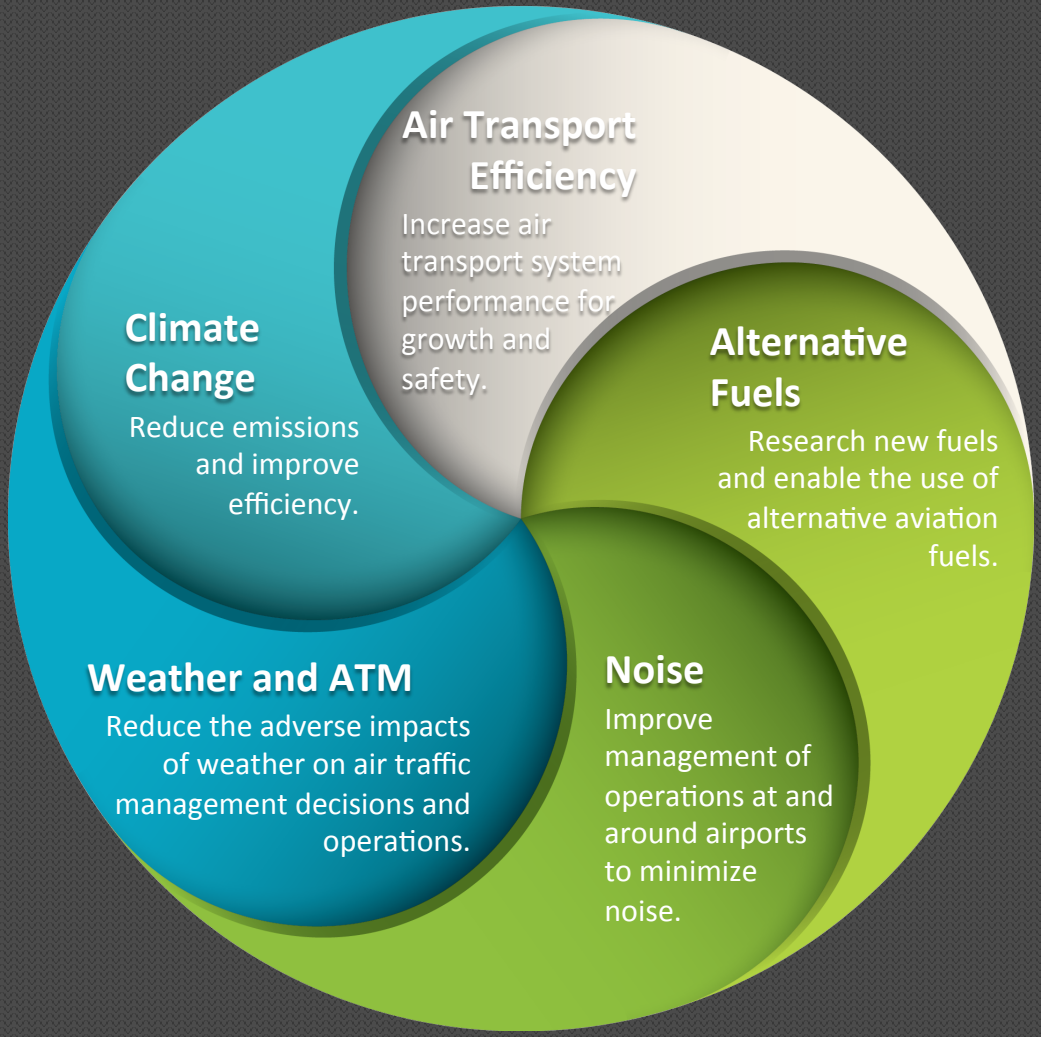
Virtual Conferences

- Give international presentations
- Join a discussion group
- Meet the presenters

Young Researcher Conference

- Meet other young researchers, senior researchers, and executives at the IFAR Summit.
- Present your research
- Address challenges in aviation research
- Participate virtually through IFARlink

IFAR's Five Focus Themes

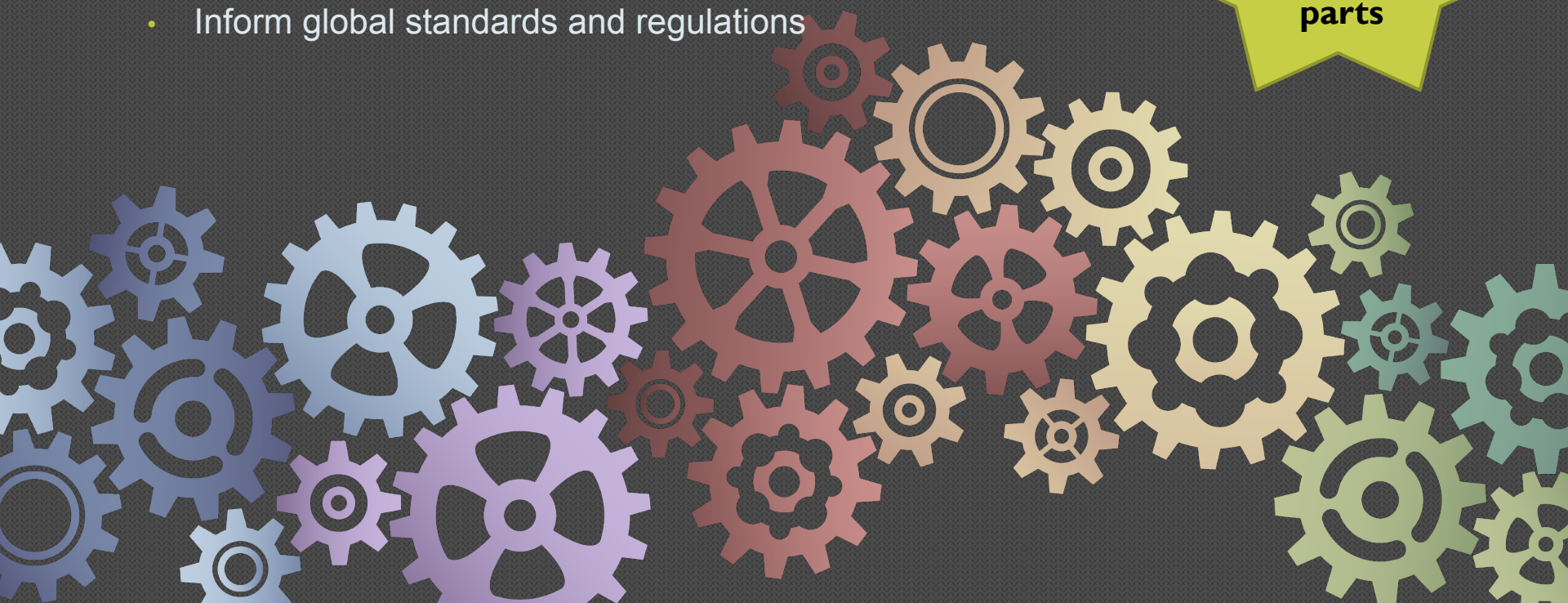


NASA

Leading International Collaboration in Pre-competitive R&D

- NASA as founding member and current chair of International Forum for Aviation Research Forum for networking, information exchanges, collaborative R&D
  - Design better tests/experiments
  - Expand data generated through R&D
  - Enhance scope and quality of analysis of results
  - Inform global standards and regulations

Total value is greater than the sum of the parts



NASA

Leading International Collaboration in Pre-competitive R&D continued

Alternative aviation fuels (9 countries)

- ACCESS-II flight demonstration

Instrumented NASA, NRC (Canada), and DLR (Germany) aircraft sampled exhaust close behind the NASA DC-8 as it burned Jet A or a Jet A/biofuel blend

Air Traffic Management (12 countries)

- Integrated Arrival/Departure/Surface
  - Global R&D roadmap development
  - Inform international standards